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# FORT LAUDERDALE BRANCH

Naval Surface Warfare Center



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# THE T&E ENVIRONMENT

The Fort Lauderdale Branch of the Naval Surface Warfare Center operates the only land-based, deep-water test and evaluation (T&E) facility located on the Eastern Seaboard. Here, NSWC and other research and development activities conduct full-scale trials of air, surface, and underwater weapon systems under a variety of oceanographic conditions.

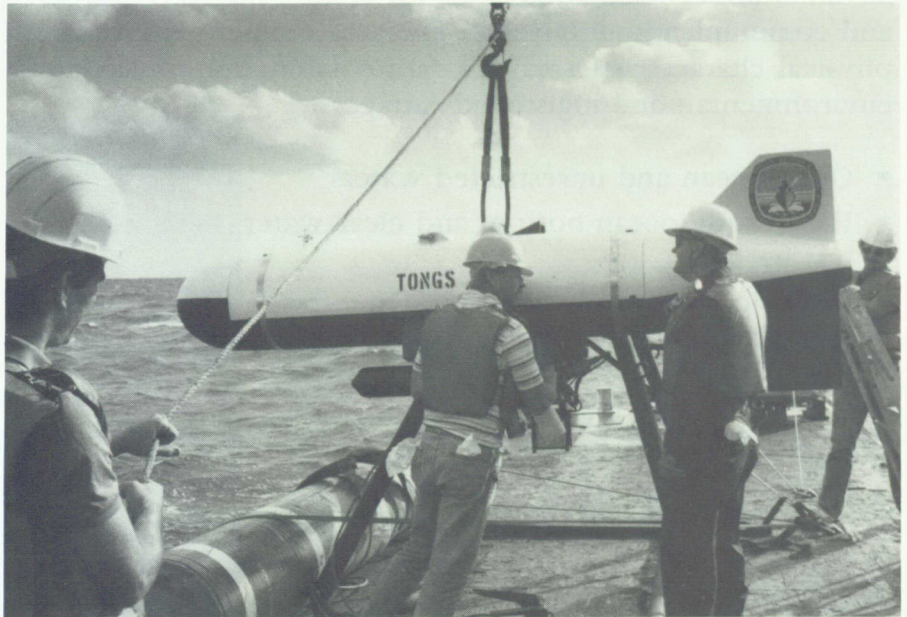


*Aerial view of NSWC's marine facilities.*

As the Navy's principal research, development, test and evaluation center for surface ship weapons systems, ordnance, mines, and strategic systems support, NSWC relies upon its Fort Lauderdale Branch to support rigorous field trials in conditions comparable to the actual operating environment. The Atlantic Ocean test range features a deep-water cable-monitoring system, a shore tracking system, and underwater and surface communications and tracking systems. The facility's experienced technical staff, excellent shore facilities, and waterborne craft combine to offer an unparalleled environment for year-round T&E operations.



The Navy established the Fort Lauderdale facility in 1952 to support the underwater mine warfare program. Through the years, Branch personnel have kept pace with the diverse and complex testing techniques required by today's advanced weapon systems and components. Working in close partnership with the Navy's operating forces, the Branch plans and supports test programs in a variety of warfare areas for NSWC as well as for other military and civilian government activities and their contractors.



*T&E operations depend upon at-sea experience and proficiency with unique devices for underwater retrieval.*

### **THE FORT LAUDERDALE BRANCH . . .**

- Conducts field trials of air, surface, and underwater ordnance systems in the Atlantic Ocean
- Recovers test hardware in depths to 2000 feet
- Develops, installs, maintains, and operates ship tracking and offshore positioning equipment
- Installs and maintains a deep-water cable monitoring system
- Provides weapon assembly and storage areas, technical and support personnel, security, shore tracking and monitoring stations, boats and utility craft to support field trials
- Provides liaison and coordination for test-related aircraft and Navy ships visiting Port Everglades

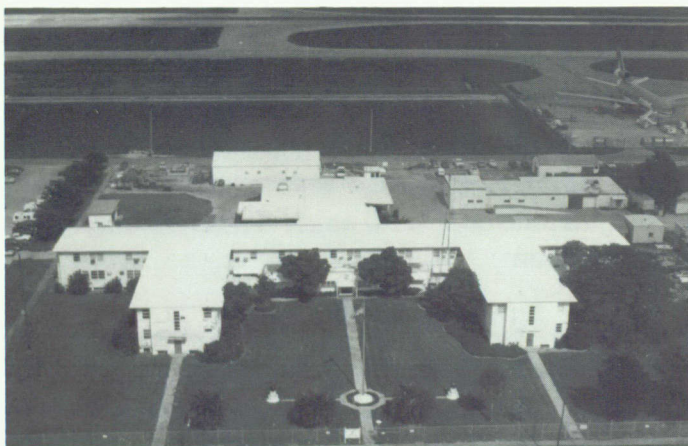
## LOCATION

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The administrative complex and shore support facilities of the Branch are adjacent to the Fort Lauderdale-Hollywood International Airport, about one mile south of Florida Route 84 and one mile west of U.S. Route 1. The range house and boats are located at the south jetty of the Port Everglades ship channel.

This is an area from which it is possible to interface with naval and air units under ideal conditions for testing interoperable weapons and communications systems. The area's superb environmental and physical characteristics offer a rare combination of technical, environmental, and logistic advantages . . .

- Open ocean and unrestricted waters
- Hard sandy ocean bottom and clear water, facilitating recovery of test hardware
- Realistic operational environment
- Sheltered harbor with controlling depth of 45 feet in the slips and 44 feet in the turning basin
- Air lanes sufficiently free to permit airdrops
- Excellent climate suitable for year-round test operations
- Proximity to Navy and Air Force activities and contract support
- Convenient to road, air, rail, and sea transportation services



*Aerial view of NSWC's Fort Lauderdale Branch administrative complex, with Fort Lauderdale-Hollywood International Airport in background.*



*The Port Everglades harbor, across the ship channel from NSWC's south jetty, accommodates large ocean-going military and commercial vessels.*



## STAFF

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The Fort Lauderdale detachment is headed by a military officer in charge and a civilian facility manager. The experienced staff represents many years of T&E expertise. Among the Branch staff are . . .

Electronic Engineers,  
Technicians  
Mechanical Engineers  
Navy Divers  
Ordnance Personnel

Machinists  
Electricians  
Model Makers  
Crane Operators  
Riggers



*Data in chart room provides basis for planning, navigation, and tracking over underwater cable fields.*



*Shore electronics instrumentation yields data from cable fields during Atlantic Ocean tests.*



*Crew readies buoy on deck of work boat RSB-1.*



## CONTRACT SUPPORT \_\_\_\_\_

Supplementary equipment and assistance for T&E projects are obtained through an NSWC support services (indefinite delivery-indefinite quantity) contract. Typical services and equipment provided by contract to NSWC, and available to other range users, include boat and range repair, small craft, fixed-wing aircraft and helicopters, heavy equipment, electronic or mechanical engineering, and skilled labor such as machinists, mechanics, and boat crews.

## SUPPORT OF OTHER ACTIVITIES \_\_\_\_\_

In addition to supporting NSWC, the Fort Lauderdale Branch conducts T&E projects for other Navy, Department of Defense, and civilian activities. Detailed information on obtaining T&E services from the Fort Lauderdale Branch appears in the final section.

### SERVICES AVAILABLE

Deep-ocean test ranges	Design and fabrication
Tracking	Assembly and storage
Data collection	Technical shops
Analysis	Personnel
Communications	Security
Work boat, utility boat	



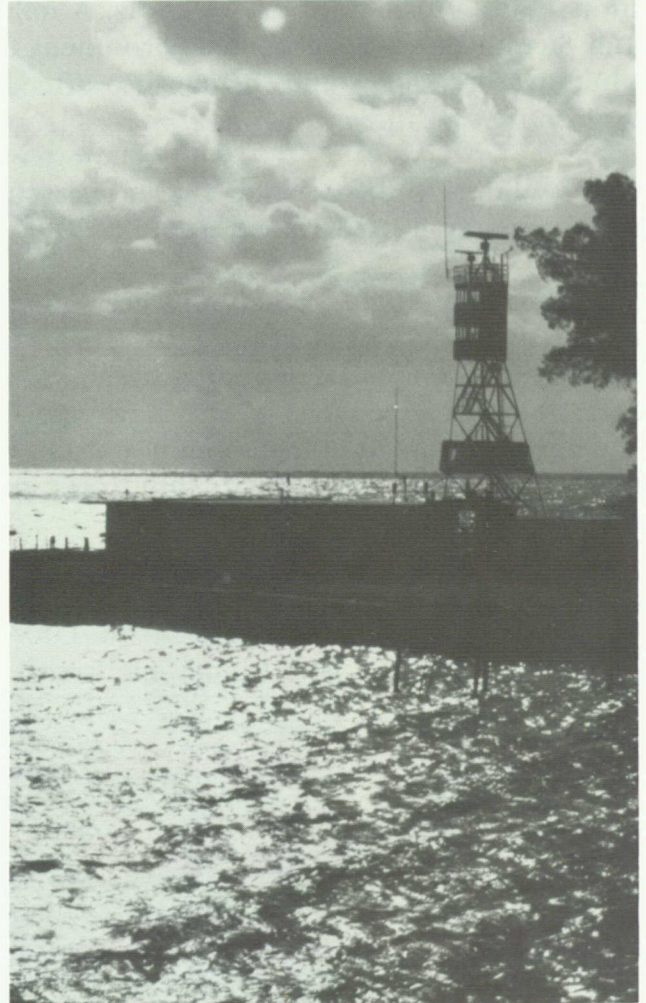
*Mines are loaded aboard aircraft in preparation for drop tests on the ocean ranges.*

# ENVIRONMENTAL CHARACTERISTICS

## CLIMATE

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The Fort Lauderdale climate is ideal for conducting test and evaluation in the waters of the Atlantic Ocean. The average annual temperature is 75 degrees. Rainfall, averaging 59.76 inches annually, is heaviest between June and September. Prevailing southeast winds average 10 to 15 knots. From November through May, the winds frequently veer through the northern quadrants.



*This tower, one of three in the optical plotting system, stands sentinel over the Atlantic Ocean.*



## WATER CONDITIONS

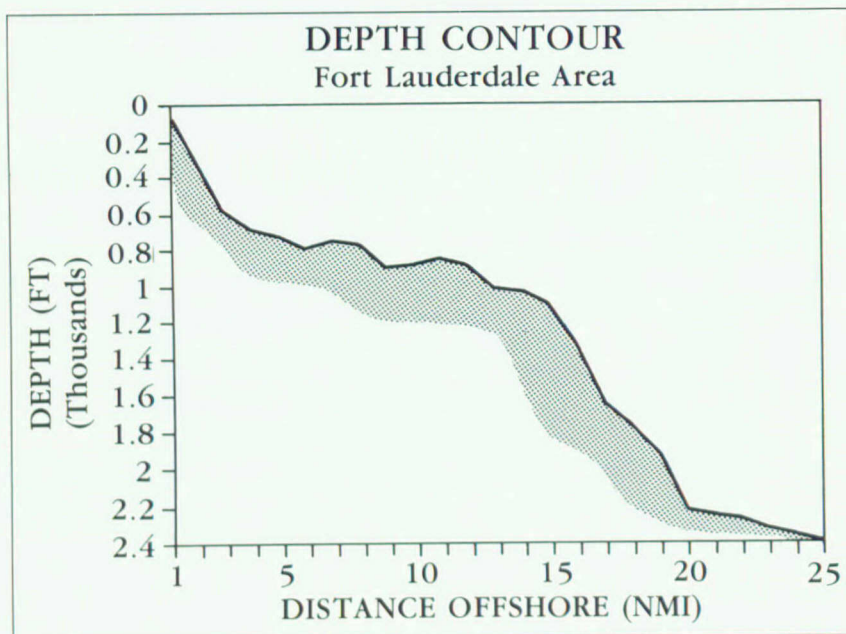
Water depths in the test area range from 500 feet three miles off-shore down to 2000 feet only 21.5 miles out. The continental shelf drops off in the test range area at its closest point to the U.S. mainland, enabling the Fort Lauderdale Branch to operate the only T&E facility with deep water so close to shore.

Tides vary from 0.6 to 3.7 feet except during unusual storm situations.

Ocean currents on the test ranges typically run between 0.5 and 3.0 knots, with a maximum of 4.5 knots. A mile or two from shore, the Gulf Stream offers a rigorous environment for underwater testing, while inshore eddies and spring tides offer a variety of currents for environmental studies.

Water salinity in the Atlantic Ocean test ranges measures approximately 35.7 parts per 1000.

The climate and water conditions are suitable for at-sea operations an average of 351 days of the year. The warm, clear waters are conducive to underwater photography, video coverage of operations, and recovery of test hardware. Trials may be conducted in deep waters with either a sandy bottom or a rocky bottom, as appropriate. The proximity to ship traffic provides realistic at-sea operational conditions.





## TEST RANGES

Tracking, ranging, and plotting are the principal functions conducted on NSWC's extensive Atlantic Ocean test ranges in conjunction with airdrops and the ranging of surface ships and submerged submarines. A system of 375 miles of underwater cables monitors the performance of test hardware at depths down to 2000 feet. Underwater cable types include multiconductor, coaxial, and fiberoptic. Each range may be equipped with underwater tracking systems and telephones. The Fort Lauderdale Branch arranges to lay additional cables to meet test program requirements of user activities.

The Fort Lauderdale Branch tests and evaluates a variety of ordnance, surface, and underwater systems in water depths from 0 to 2000 feet. Typical operations involve...

Underwater ordnance deployment, ranging, and recovery

Tactical ships' data

Autonomous vehicle tracking

Mine countermeasures

Trajectory and water-entry performance

Submerged ordnance hardware



*Plotting station operator takes bearing on point of water entry.*

Test hardware is deployed by surface ship, submarine, or aircraft. Representative of the research, development, test and evaluation systems and operations conducted here...

- Mine Deployment Systems
- Underwater Mines
- Mine Hunting Operations
- Minesweeping Operations
- Mine Neutralization Operations
- Torpedoes
- Remotely Operated Vehicles
- Swimmer Weapon Systems
- Environmental Testing
- Oceanographic Research Operations



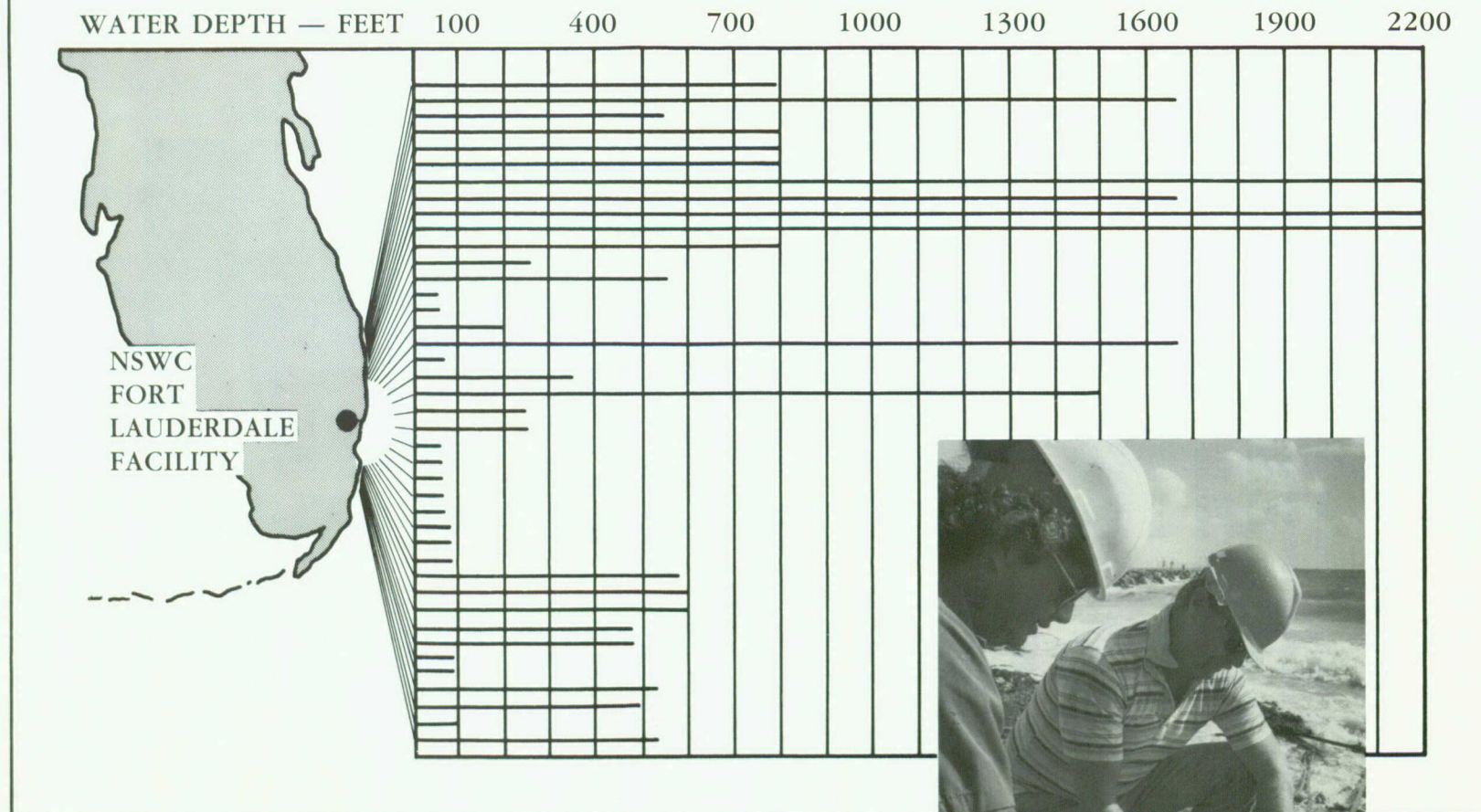
*A "pinger" is installed on target submarines for tracking purposes.*

An optical plotting system employs three plotting stations with a 5.18-nautical-mile baseline facing the Atlantic Ocean. By triangulation, bearings from these stations pinpoint water entry of test items within  $\pm 5$  feet. This plotting system also provides data used to position vessels engaged in recovery operations.

Ranging and plotting techniques depend upon the nature of the tests, which may involve airdrops, surface ship ranging, or submerged submarines.



## NSWC Fort Lauderdale Facility Cable Field Chart



*Underwater cables are examined  
at water's edge.*

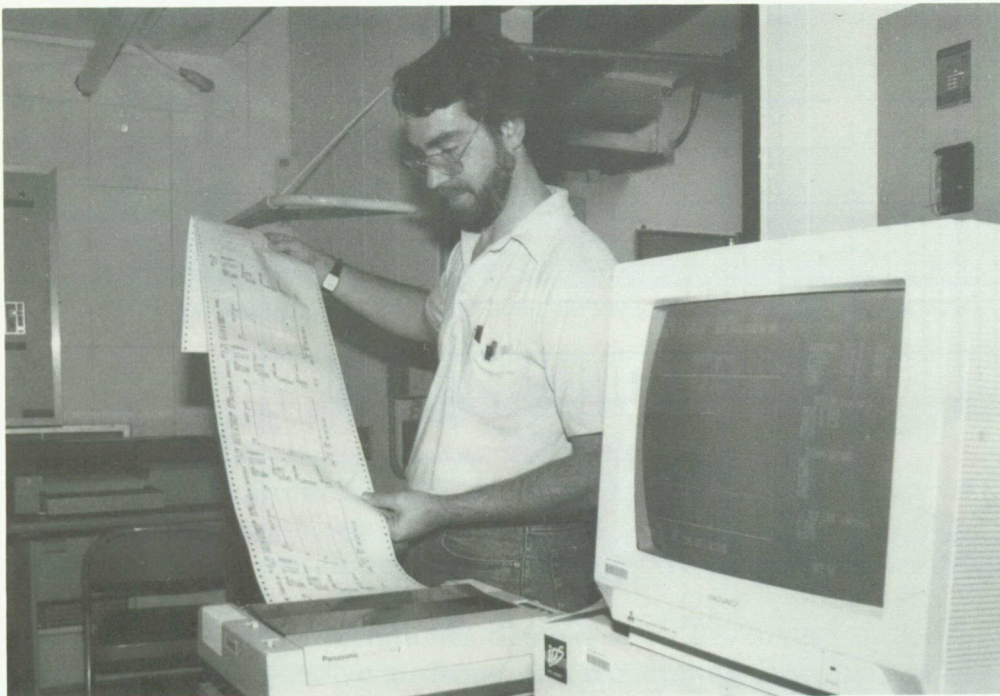




# DATA ACQUISITION AND ANALYSIS

TEST TYPE	TRACKING TECHNIQUE
AIR	RF, Microwave, and Optical
WATER ENTRY	Optical and Acoustic
SURFACE	RF, Microwave, and Optical
UNDERWATER	Acoustic

Skilled NSWC employees consult with range users on the optimum method of acquiring and analyzing data for a given project, and offer assistance in installing user instrumentation prior to T&E.

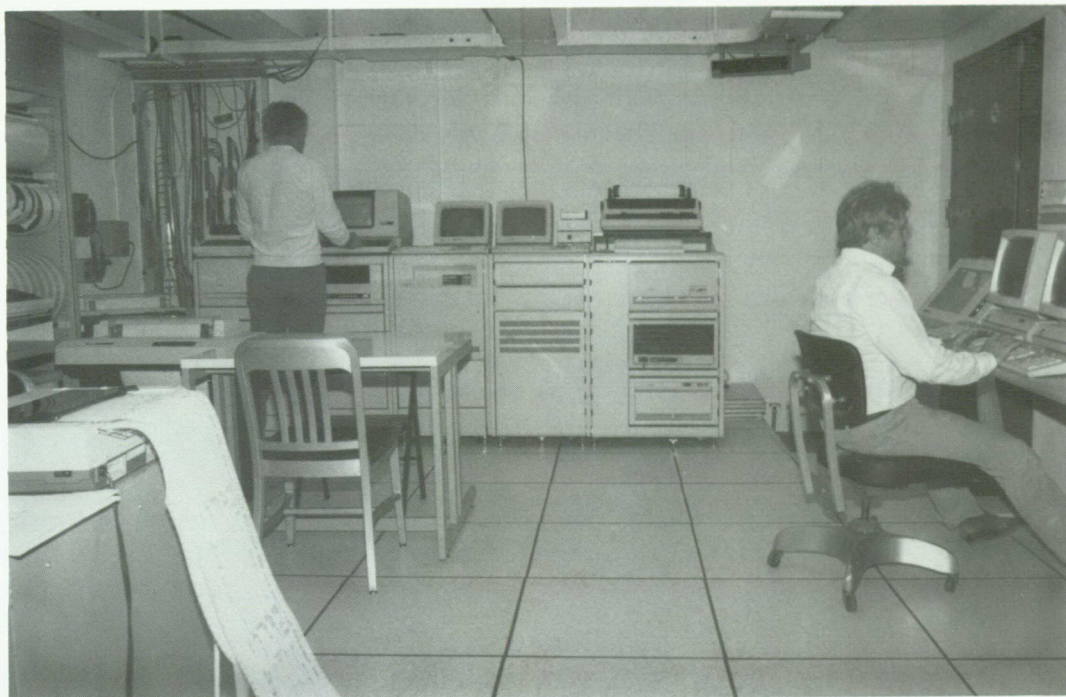


*NSWC employee examines acoustic doppler current profiles in tracking room.*

Underwater cables and associated instrumentation at the Fort Lauderdale Branch yield data on how mines and other devices react to ships and submarines. The underwater cables terminate at the NSWC range house located at the Port Everglades harbor entrance, where system performance is monitored.

The instrumentation systems gather in-water acoustic and non-acoustic data, simultaneously monitoring multiple hydrophones and non-acoustic sensors. Initial tests are run on a collection of sensors to provide a data base for future effort.

Data from the test range is relayed to the range house, where it is recorded. The range control center is equipped with monitors, data display, and computers for rapidly processing and analyzing the incoming data.



*The range house serves as the nerve center for incoming data from the ocean ranges.*



## MARINE FACILITIES

The Fort Lauderdale Branch operates various marine facilities from its site on the Port Everglades ship channel. The facility's small craft—including work, utility, and dive boats—are berthed at the south jetty of the channel. Three cement piers, 41 feet long by 5½ feet wide, with water depth of 10 feet, accommodate small craft up to a maximum of 75 feet.

A large, open area adjacent to the piers is convenient for loading and unloading craft, reeling and splicing cables, and as a general work area. A two-story building serves as a combination assembly area, office, and stowage area for auxiliary support equipment.



*Leaving its pier at the south jetty, work boat RSB-1 enters the Port Everglades ship channel.*

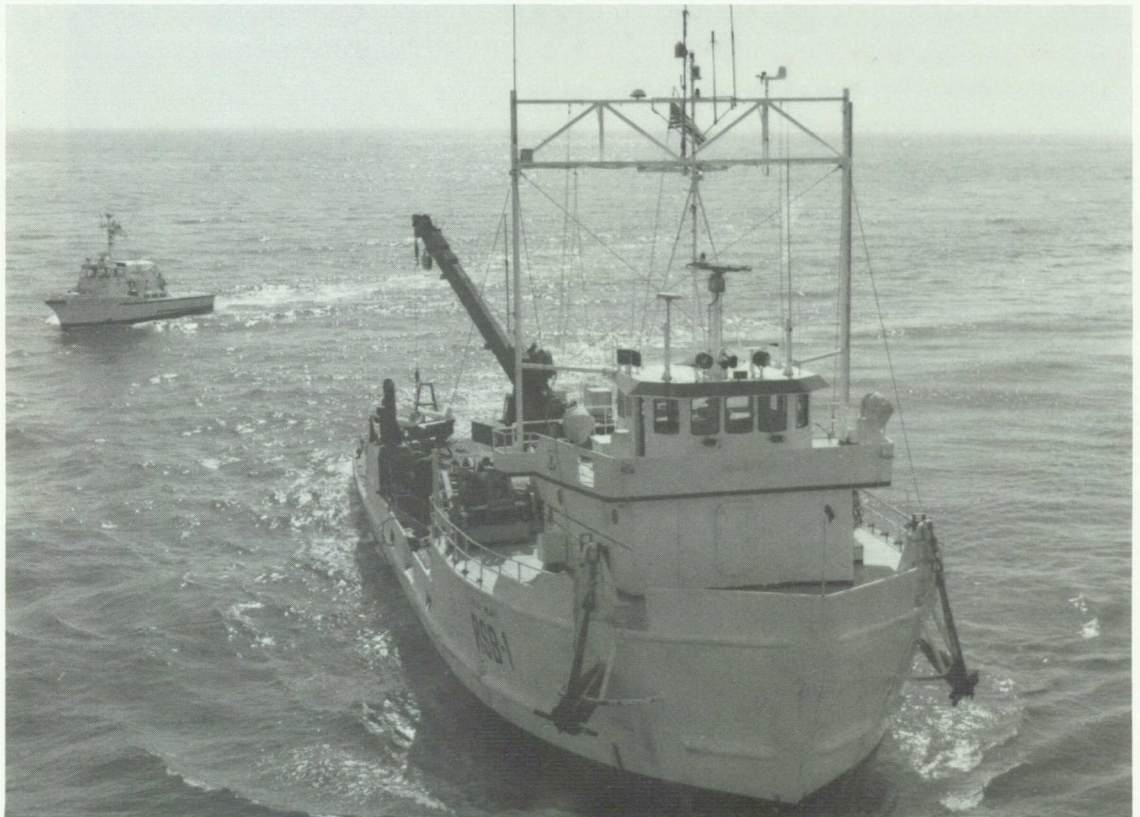


## RSB-1 WORK BOAT

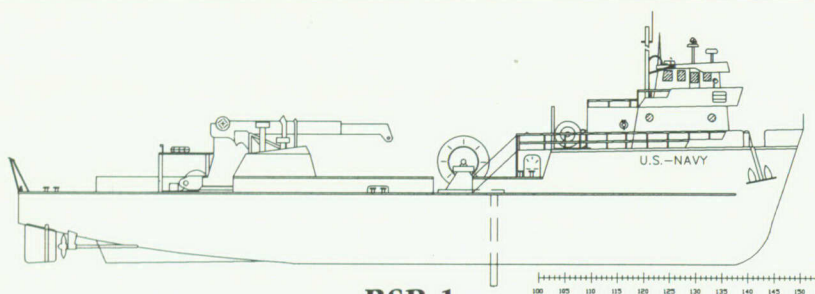
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The workhorse of the T&E mission is RSB-1, an all-steel, 157-foot work boat manned by an experienced 10-man NSWC crew and technical teams engaged in marine operations. She has worldwide range, good speed, and an unusually large work deck. Her flume stabilization system, along with her broad beam, provide a stable working platform in heavy seas and ocean transits. RSB-1's transverse bow thruster and active rudder provide precision maneuvering and station keeping.

RSB-1 easily accommodates the large wire ropes and cables necessary for deep moors, as well as instrumentation arrays and heavy loads associated with T&E tasks. A stern-mounted 35-ton crane with 84-foot reach is especially designed to carry over 3000 feet of cable—approximately six times the capacity of a standard cable drum.



*The deck of the 195-gross-ton RSB-1 forms a 2900-square-foot work area.*



**RSB-1**

## SELECTED SPECIFICATIONS

**LENGTH OVERALL: 157'**

**MAXIMUM BEAM: 36'**

**DRAFT: 9' mean**

**PROPULSION:** Twin screw diesel (Caterpillar), rated 1530 total h.p. Bow thruster rated 100 h.p.  
Active rudder rated 100 h.p.

**ELECTRICAL:** Two 100 KW 60 Hz AC Generators  
(General Motors). 10 KW conditioned power

**COMMUNICATION AND NAVIGATION:**

*Fathometer:* SITEX 580 fathom

*Radar:* X Band Ratheon RM 1250

*Loran:* Raytheon RayNav 750 MK II

*Gyro Compass:* Sperry MK 14

*Radios:* SSB Motorola Micom 2182, 2670, and 2336 KHz

VHF-AM 119-135 MHz EDO PRT551

UHF 225-400 MHz Collins GRC-171

VHF Marine Horizon

Maxi All-channel FM

*Underwater Communications:*

AN/UQC-1

*Ship Positioning:*

DelNorte 540 Trisponder

NOTE: Complete RSB-1 specifications available upon request.





## 65UB841 UTILITY BOAT

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A utility boat, 65UB841, assists RSB-1 operations by performing the following tasks...

- As security and safety boat, plants and recovers cables or hardware 15 to 20 miles out in the Atlantic Ocean.
- Transports and transfers personnel, hardware, and equipment between port and mother ship.
- Serves as platform for taking oceanographic data (bathythermographs, current profiles, sound velocity profiles) and towing side-trace sonars and small triplanes.



*Maximum speed of the utility boat is 18 knots continuous with a full cargo of 5,000 pounds.*

This utility boat, 65 feet long with a 14-foot beam, operates at 18 knots with a full cargo of 5000 pounds, a crew of three, and a full load of fuel, water, and general supplies. It has twin screw, counter-rotating propellers, and can be operated from two steering stations, one in the pilot house and one aft.

## TONGS—FOR SEA FLOOR RECOVERY

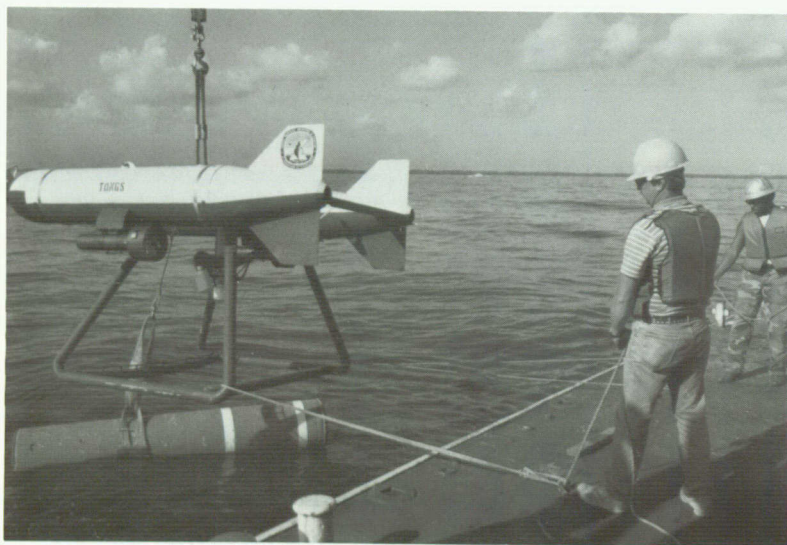
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TONGS—Television-Observed Nautical Grappling System—a unique device developed by NSWC technicians and engineers, plants, locates, repositions, and retrieves experimental weapons, underwater cables, and test hardware from the ocean floor. TONGS operates without the restrictions of depth and bottom time imposed on underwater divers.

The central TONGS component is an underwater sled outfitted with two thruster motors for lateral maneuvering, two stabilizing fins, a television camera, a passive hydrophone, and sonar equipment. Because the sled is designed to accept a diversity of work systems and robotics devices, TONGS readily adapts to a variety of T&E missions.

The TONGS search diameter is 60 feet at depths down to 6000 feet. The lift capability of sled assembly and cabling is in excess of 15,000 pounds.

Work boat RSB-1 deploys TONGS and operates the system remotely from its TONGS control center. Instrumentation in the control center includes two deck cameras; an acoustic system that locates the sled in relation to the boat; obstacle avoidance sonars; side-scan sonars; and passive detection systems. TONGS' proven track record includes successful deep-water research, recovery, and rescue operations.

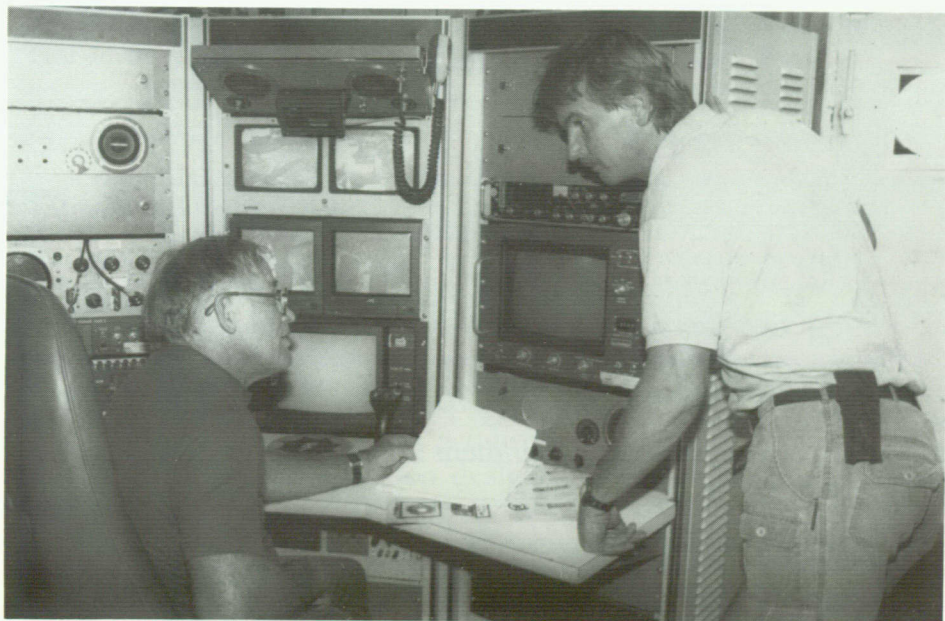


*TONGS retrieves underwater mines from ocean floor following tests.*





*TONGS capability is continually evolving to meet current Navy T&E requirements.*



*Instrumentation in the TONGS control center on board RSB-1 is designed to receive maximum underwater data and achieve safe operating conditions.*

## NAVY DIVERS

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Navy diving teams attached full time to the facility are trained and experienced in underwater recovery operations. Most diving operations occur in less than 120 feet of water using conventional scuba gear. The divers also perform underwater inspection and repair of Navy ships and submarines at Port Everglades.



*Divers are proficient at finding and recovering post-test hardware in water down to 120 feet.*



*NSWC diver checks sensor alignment in preparation for underwater trials.*



## SHORE SUPPORT

At-sea T&E missions rely heavily on the quality of available shore support. At Fort Lauderdale, NSWC maintains excellent facilities for preparation and assembly of test materials, staging, logistics support, and the administrative functions vital to effective test programs. Experienced personnel operate the specialized shops, electronics equipment, and heavy equipment; provide ordnance handling and storage; and perform technical and administrative coordination for NSWC T&E projects as well as those of user activities.



*The mine assembly shop measures 100 by 50 feet.*

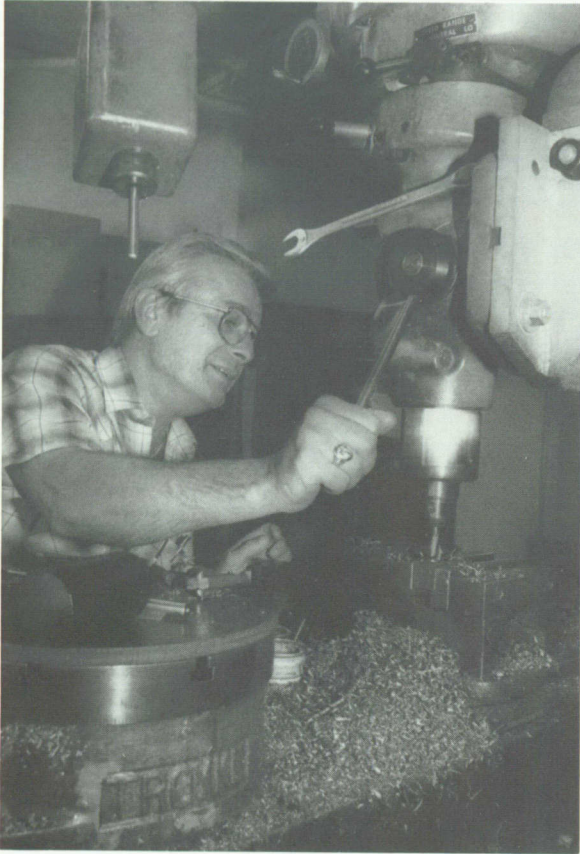
## SHOPS

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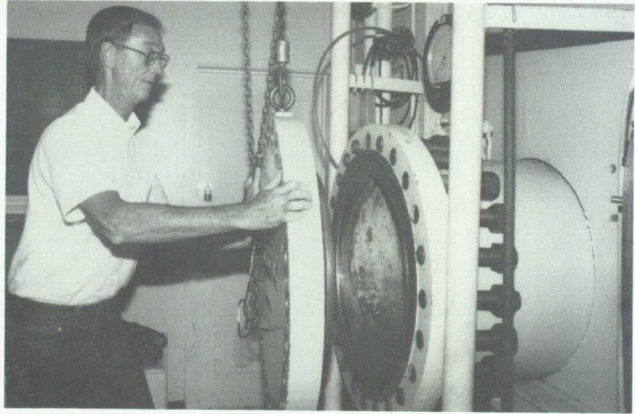
Secure, fully equipped industrial shops adjacent to the Branch administrative offices easily accommodate on-site fabrication, assembly, and repair of T&E hardware. The largest of the two assembly shops measures 50 by 100 feet. Branch personnel, who routinely design and fabricate buoy systems, towed devices, and mooring systems tailored to test requirements, also provide consultation and assistance when design and repair problems arise during T&E.

## MAJOR SHOP FACILITIES

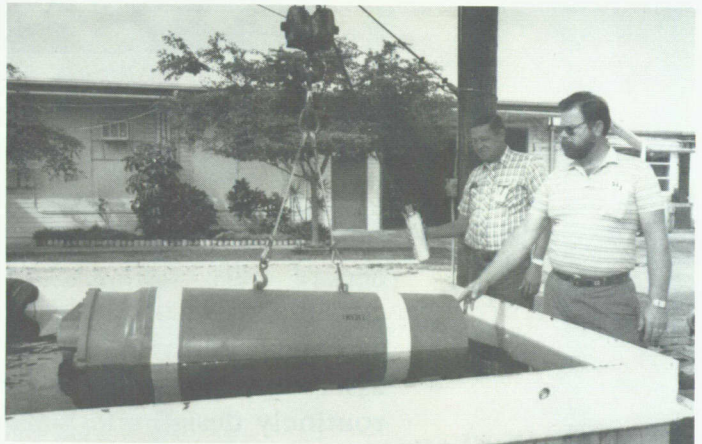
- Large Assembly Shop
- Small Assembly Shop
- Exclusion Room with pressure vessel
- Machine, Welding, Electric, and Carpenter Shops



*Model maker operates milling machine to prepare a component for testing.*



*Hydrophones and weapons are tested in the pressure vessel at working pressure of 1000 psi; vessel is 14 feet long and 24 inches in diameter.*



*Mine is lowered into the test tank to check for indications of faulty seals.*



## LOGISTIC SUPPORT

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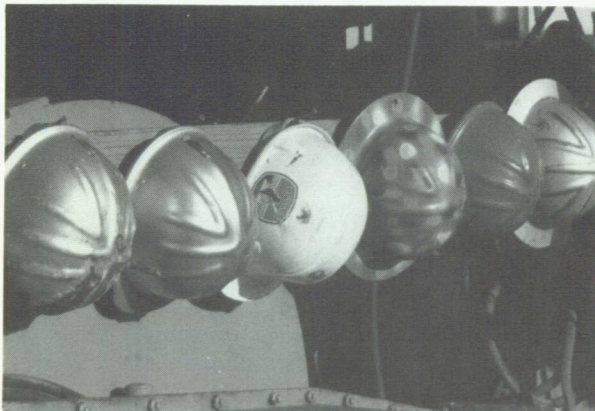
The proximity of NSWC's Fort Lauderdale Branch to Port Everglades and the Fort Lauderdale-Hollywood International Airport greatly facilitates shipping and receiving T&E equipment and hardware. A fleet of motor vehicles and heavy handling equipment—including trucks, cranes, and forklifts—easily transports test materials to staging areas. Heavy materials shipped by water may be off-loaded directly aboard the work boat RSB-1 or staged at the Branch's boat dock facility. Aircraft operations may be staged at the airport adjacent to the administrative and shore support facilities. The Branch maintains controlled-climate storage, open storage, and storage for explosives and flammable materials.



*Rigging frames 65UB841 utility boat.*



*Forty-ton crane lifts APL heat flux spar buoy to deck of RSB-1.*



*Ordnance is loaded aboard aircraft at the airport staging area.*

## TECHNICAL PHOTOGRAPHY

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Photographers from NSWC are available to record test operations upon request. Photographic coverage includes documentary, high speed film and video.



*NSWC photographer records airdrops with high-speed video camera.*

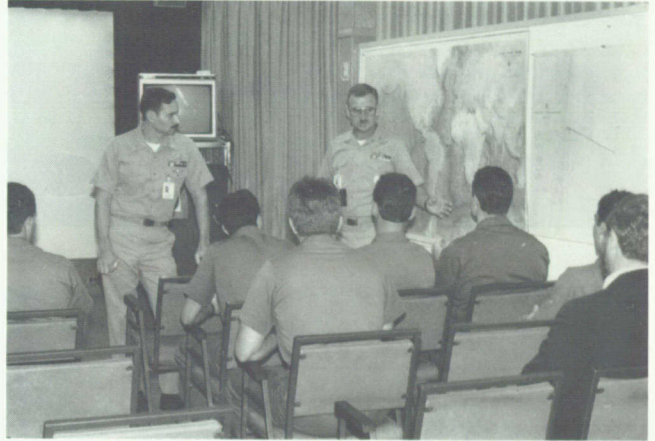




## OFFICE AND ADMINISTRATIVE SERVICES

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A large furnished office and spacious conference room are available for use by range users. Communications include telephones, fax, and computers with access to ARPANET and MILNET. Audiovisual equipment is available for use in the conference room.



*Conference room.*

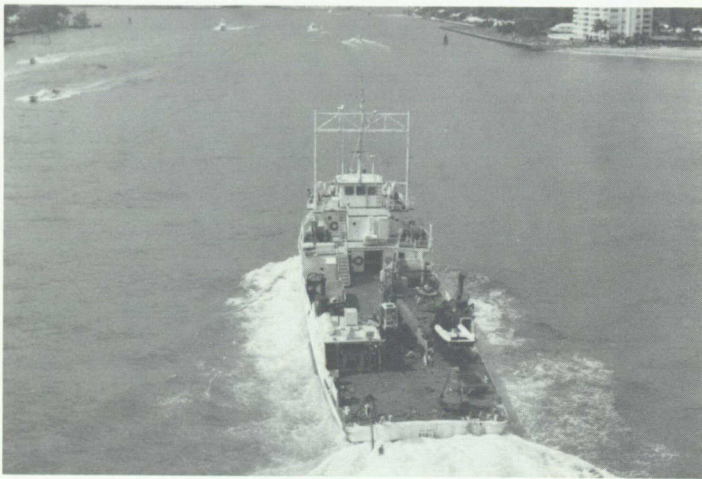
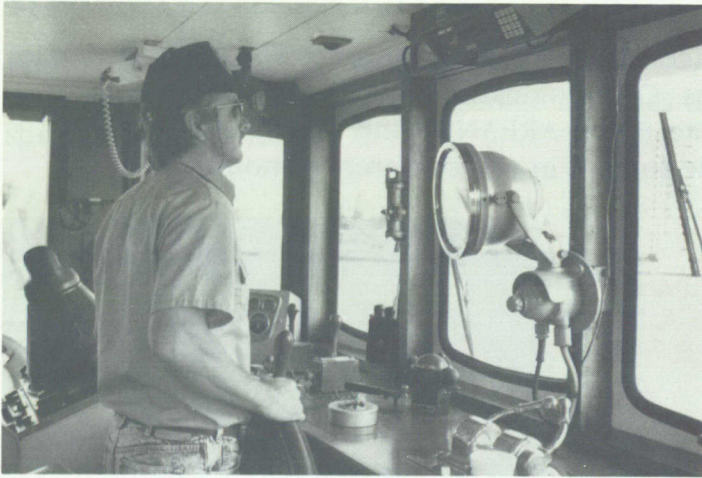
## SECURITY

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The administrative complex and range house areas are enclosed by a chain-link fence. Overall security is maintained by a 24-hour civilian guard force. Stowage is available for classified material.



*Explosive storage is available; maximum capability for Class A explosives is 50 pounds.*





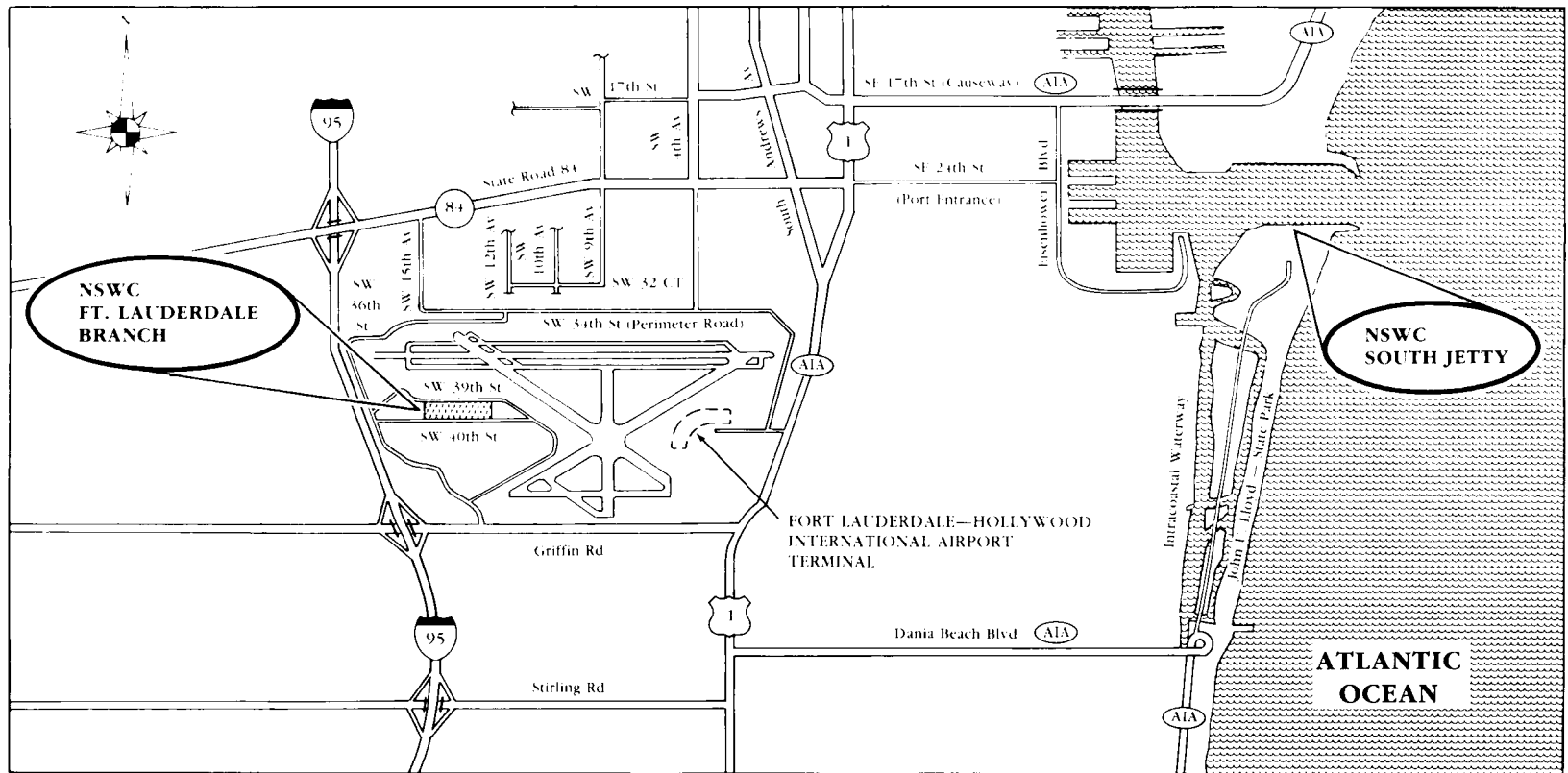
## **OBTAINING SERVICES**

The test and evaluation facilities of NSWC's Fort Lauderdale Branch may be scheduled on a "time available" basis by government and civilian activities that require convenient access to open ocean ranges, data acquisition and analysis, marine facilities, and shore support. Advanced planning and on-site assistance are provided by the experienced staff of the Fort Lauderdale Branch, with additional contract support as may be required. Early consultation is recommended for planning purposes.

Intra-service Support Agreements describing the scope, schedule, and funding arrangements may be entered into on either a short or long term basis.

For information about NSWC's Fort Lauderdale ranges and facilities, contact...

Officer in Charge  
Naval Surface Warfare Center  
1650 SW 39th Street  
Fort Lauderdale, FL 33315-3528  
Telephone: (305) 766-8213  
Fax: (305) 766-8212



*The Fort Lauderdale area offers overnight accommodations, dining facilities, and beautiful ocean beaches, all easily accessible from NSWC's Fort Lauderdale Branch.*



